

The Wauconda Water Reclamation Facility

A Virtual Tour



Overview

Wauconda's Water Reclamation Facility prevents waste materials generated by residents and businesses from entering the environment.

The facility is required to meet standards put in place by the Illinois EPA and the US EPA on a number of parameters that are tested daily, weekly, monthly, quarterly, semi-annually and annually.

The treatment process protects the receiving waters that the facility discharges into, namely Fiddle Creek and the Fox River.

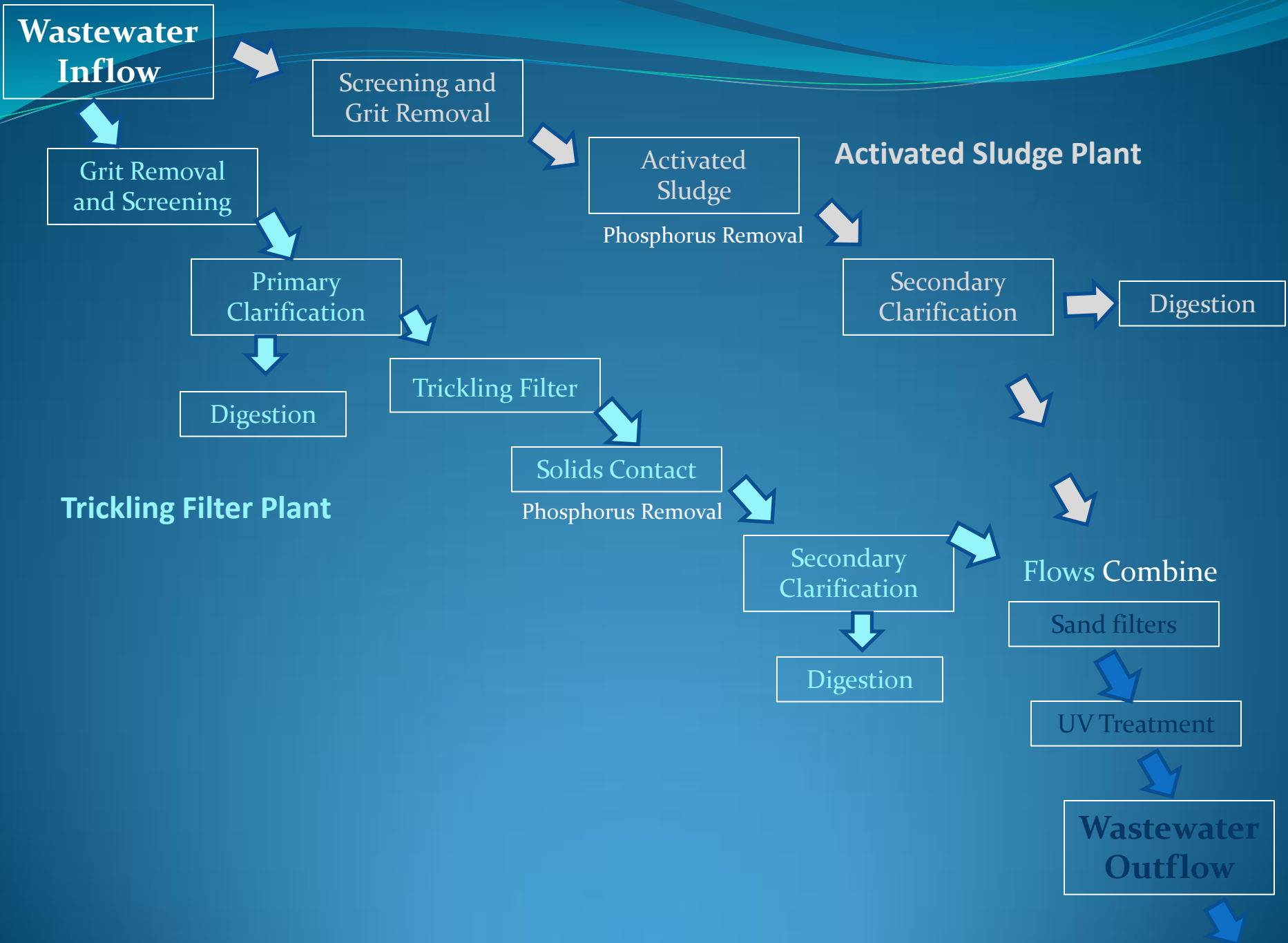
Getting Started

This virtual tour will follow wastewater as it passes through the various steps in the treatment process. These steps are:

- Preliminary Treatment
- Primary Treatment
- Secondary Treatment
- Digestion
- Final (Tertiary) Treatment

Two Plants on One Site

Wauconda's wastewater treatment process is unique in that there are essentially two treatment plants operating in parallel. Wastewater enters the facility and is split into two flow streams. One stream goes to the trickling filter process and the other goes to the activated sludge process. The activated sludge process was added in 2007 as the Village of Wauconda grew. As Wauconda expanded, its capacity for wastewater had to grow as well. During the tour, you will notice that two pieces of equipment often perform the same function. This is necessary because of the two flow streams. The following slide has a flow diagram of the facility to help explain the unique treatment process at our wastewater treatment facility.



Preliminary Treatment

Grit Removal

The first step in the water treatment process removes materials such as sand/gravel, eggshells, and coffee grounds. These items are removed at the beginning of the process because they can be very abrasive on pumps and other equipment. Grit is removed at two points, one uses a grit screw, the other uses a vortex grit remover.



Preliminary Treatment

Screening

Wastewater entering the facility can also carry with it trash and debris that can't be broken down by the treatment process. Items such as paper, rags, plastic wrappers, and much more are removed by our two screeners (pictured below).



Preliminary Treatment

Odor Control

As many would suspect, there are some offending odors involved with the wastewater treatment process, but it might not be as bad as expected. Most of the odors are associated with the raw wastewater as it enters the facility. Fortunately, there are odor control units that pull air through activated carbon canisters to strip the odors from the air.



Primary Treatment

Primary Clarifiers

These large rectangular tanks allow many of the solids in the wastewater to settle to the bottom, while fats and greases float to the surface. The dark horizontal structures pictured in the photo are called flights. These flights travel the length of the tank on the surface and at the bottom of the tank to collect the solids, fats, and greases. After treatment at the primary clarifier, 45 -50% of the original pollutants have been removed from the water.



Secondary Treatment

Secondary treatment is really the 'heart' of the treatment process, where the wastewater really gets cleaned. Secondary Treatment involves the use of bacteria to breakdown the waste in an effective and efficient way. There are many different types of secondary treatment, the Village of Wauconda utilizes both trickling filters and activated sludge.

Secondary Treatment

Trickling Filters

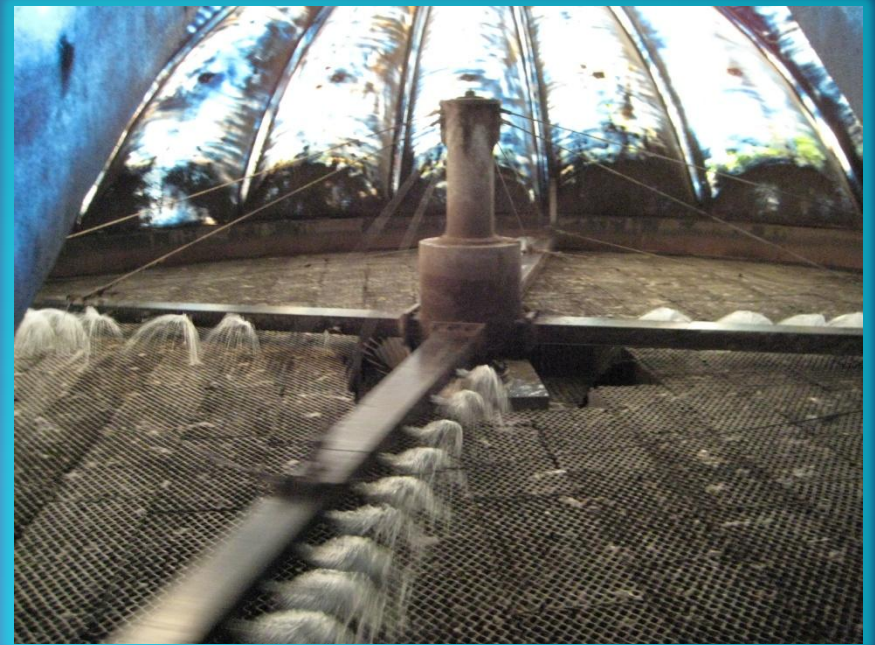
Trickling filters are also referred to as biotowers. These structures are packed with a plastic media that look like four foot square blocks of honeycomb. The media is constructed in this manner to provide a very large surface area for slime growth to develop. At the top of the tower is a water distribution head that is much like a big sprinkler. As wastewater is sprinkled over the slime growth, it is cleaned by the bacteria and other microorganisms that make up the slime. During this process, the bacteria are snatching the nutrients , or waste, out of the water and using it for food which cleans the water. The biotowers at our facility have been in operation since 1985.

Trickling Filters

Half of Wauconda's wastewater receives its secondary treatment from trickling filters.



The facility's two trickling filters (or biotowers)



Inside a Trickling Filter

Secondary Treatment

Solids Contact Tank

After passing through the trickling filters, the wastewater has been cleaned dramatically. However, there are residual bits of solids and some pieces of the slime growth that have sloughed off the honeycomb structures. At this point, the water is gently agitated to allow those tiny bits of solid material to cling together to form larger clumps that will settle in the secondary clarifiers.



Secondary Treatment

Nutrient Removal

Phosphorous is a nutrient which, when released into the environment, can cause excessive algae blooms to occur. Algae blooms kill fish and harm other wildlife, because dying algae can deplete oxygen levels in the water.

Phosphorous is removed from the waste water by adding Ferric Chloride. Ferric Chloride bonds with the phosphorous and will settle with the solids in the secondary clarifiers. Ferric Chloride is pumped from the large white tank in the picture to the solids contact tank, and to the activated sludge tanks which are next on our tour.



Secondary Treatment

Activated Sludge

Activated sludge is the second of the two secondary treatment processes used at our facility. Like the trickling filters, this process is based on bacteria consuming the waste in the water. The difference here is the environment in which the bacteria are living. The activated sludge process takes place immediately after grit removal and screening. Raw wastewater enters a series of tanks and is blended with a concentrated mixture of bacteria and waste, referred to as 'sludge'. Air is piped to the bottom of the tanks holding this mixture where it is then allowed to bubble to the surface. The air bubbles mix the material in the tank while providing the bacteria with oxygen to live. The bacteria in the sludge are very hungry and readily break down the nutrients contained in the raw wastewater.

Activated Sludge

These are the activated sludge tanks. The green-topped pipes send air to the bottom of the tank. It then bubbles to the top and 'mixes' the material together. The white pipes hanging near the surface have dissolved oxygen sensors mounted on the ends. We use these sensors to monitor the overall health of the process.



Secondary Treatment

Secondary Clarification

Secondary clarification follows both the trickling filters and the activated sludge process. The facility has four clarifiers – one for each plant and two that are used during high flow events after a rain or snow melt.

Similar to the primary clarifiers, the 'secondaries' allow solids to settle and be collected. The majority of these solids are recycled back to the beginning of the plant because they contain a lot of bacteria that have consumed all of their "food" and are hungry for more. A smaller portion of these solids are removed and sent to the digestion process. This way there is not an overabundance of solids in the system.



Secondary Clarifier

After the activated sludge process, wastewater goes directly to the secondary clarifier. In the center of the tank you can see a baffle, where the water flows into the tank. This tank is approximately 15-18 ft. deep, and the bottom is pitched towards the center of the tank. The solids settle to the bottom and are collected there while the clear water flows over a weir and on to the last stages in the treatment process. The weir is the scalloped edged structure along the outer rim of the tank.



Digestion

Solids Handling

Solids that have been removed from the trickling filter process are concentrated much like the Activated Sludge, but to a much greater degree. This thick sludge is mixed by air in a tank called a Digester. Here the solids are broken down further to meet USEPA standards. This sludge is eventually used as fertilizer on farm fields.



Final (Tertiary) Treatment

Sandfilters

Wauconda's facility utilizes three sandfilters to remove the tiniest bits of solid material that may remain in the water after secondary clarification. If you have a swimming pool filter, the sand filter operates in a similar fashion, just on a larger scale. About 4 feet below the water surface is a bed of sand. The water enters the tank and flows down through sand, leaving the solids trapped in the sand. The bridge mechanism moves along the length of the tank cleaning the solids from the sand.



Final (Tertiary) Treatment

UV Disinfection

This is the last step in the treatment process. The Illinois EPA requires the water to be disinfected as it leaves the facility to prevent any infectious-disease-causing-bacteria from entering the receiving waters. This is accomplished using ultraviolet light. As the water leaves the facility it travels through a channel (beneath metal grating at right top) containing rows of UV lamps (pictured at right). As the water passes these lamps, the UV light destroys the DNA in the bacterial cell, killing the bacteria. During normal flows this can be accomplished in about ten seconds.



Reintroduction to the Environment

Fiddle Creek & the Fox River

As mentioned earlier, the facility discharges the final effluent into Fiddle Creek which is a tributary to the Fox River. As the creek flows to the river, it contributes to a large area of wetlands that are enjoyed by fish, waterfowl, and other wildlife.

